

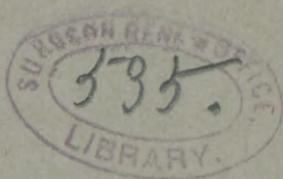
DANA (C.L.) & CONWAY (J.R.)

A Case of Successful Operation
for Brain Tumor.

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A CASE OF SUCCESSFUL OPERATION FOR BRAIN TUMOR.

BY CHARLES L. DANA, M.D.,

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HISTORY, BY DR. DANA.

THE following case was so satisfactory from a therapeutic point of view and adds so distinctly to the achievements of cerebral surgery that no excuse is needed for placing it on record. Aside from its importance in giving renewed confidence to the surgeon and neurologist, it has much clinical interest on account of its bearing on the question of the sensory functions of the motor area of the brain cortex.

HISTORY OF THE CASE.—Jacksonian Epilepsy; Paralysis of Left Arm, with Sensory Troubles; Headache; Optic Neuritis; Operation, with Improvement of Symptoms.—Charles T., aged sixteen years, was born in Germany. The family history is negative. There is no history of any specific infection or of alcoholic habits. About three years before admission the patient had received a blow on the left side of the head, just over the squamous suture. He was somewhat stunned, but speedily recovered and apparently suffered from no after-effects. About six months later he began to suffer from headache and epileptic convulsions,

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which latter, so far as I can learn, were general in character. He had two or three every month for a year. At the end of this time—that is, about a year and a half altogether—he noticed that the attacks began with sensations of tingling and numbness in the left fingers, and that the convulsive movements affected the fingers and arm first. They were followed by unilateral convulsions and unconsciousness. These attacks increased in frequency until he had sometimes one or two a week. About a year ago he noticed that his left arm was becoming weaker and smaller. Five or six months before admission he again suffered from severe pains in the head, and occasionally had attacks of vomiting. He had no trouble with the legs or with the face. The symptoms increased, and he began to suffer from pains in the left arm as well as weakness and stiffness, and sensations of numbness and pricking. When the convulsive attacks came on, he experienced intense pain in the arm before unconsciousness set in. He was first seen by me, May 29, 1894, at my clinic at the Post-graduate School, and at about that time he had had four consecutive fits in one day.

Physical Examination.—The boy seemed to possess a fair degree of intelligence. His gait was normal, and he apparently had no weakness or disturbance of the leg. There was a slight amount of weakness of the muscles of the lower half of the face on the left side. The left arm was very weak, so that he could raise it but a little way from the side, and the grasp of the hand was only about ten on the dynamometer, the normal being forty-five. Detailed examination of the left arm showed weakness of the deltoid, and of the flexors and extensors of the forearm. Supination was nearly impossible, pronation moderately good. Flexion of the fingers and wrist very weak; unable to grasp a pencil or hold a tumbler. There was total paralysis of the adductors and abductors of the fingers and of the extensors of the wrist and fingers. Circumference of the left forearm, three inches below the olecranon process, eight inches; right forearm, nine inches. There was exaggeration of the tendon reflexes of the arm, and every now and then clonic movements of the flexors and extensors of the fingers and also of the flexors of the forearm took place. Slight irritation of the finger-

tips would cause a sharp, painful contraction of the forearm and hand. The left arm was colder and redder than the right.

Sensation.—The sense of contact over the left hand and arm is slightly diminished; he is unable to locate the point of contact within two or three inches. Two points, two centimetres apart, on the finger-tips are felt as one. Localization by placing the fingers of the normal hand on a definite point on the paralyzed hand is defective; but he localizes better an object on the right hand with his left finger than on the left hand with his right finger. Pain sense, if anything, slightly overacute; a pinch or a prick of the left hand causes more pain than on the corresponding part on the right hand. He suffers from neuralgic pains in the left arm. Temperature sense normal to both heat and cold. Muscular sense is defective; he does not recognize the position of the fingers or hand or arm well, and he does not recognize weights well. The most striking defects, therefore, are the impaired muscular sense and the impaired localization sense, together with a little hyperalgesia and excessive reflex excitability. The left leg shows slight increase in the knee-jerk, but no ankle-clonus and no particular motor weakness, nor is there any sensory trouble. There is very little motor trouble in the face and no sensory disturbance. The right half of the body is normal.

The patient complains a great deal of intense frontal headaches, which, he says, are worse at night and in the early morning. Examination of the eye shows a well-marked optic neuritis on both sides; the visual acuity, however, is still good, though there is some limitation of the visual field. Hearing, smell, and taste are normal. The bodily functions, aside from those described, are normal; the appetite is good; the bowels are regular.

The patient, as may be seen, presented in a typical manner the general symptoms of a brain tumor and also well-marked localizing symptoms. Owing to the fact that the left arm was paralyzed and that sensory disturbances were present here, and that the face and leg were but little affected, it was easy to say that the lesion was affecting the

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arm centre of the right cerebral hemisphere. The fact that the pain and paræsthesia and initial convulsive movements began in the fingers indicated that the finger and hand centres were more particularly involved. The diagnosis of a tumor involving the hand and arm centres was therefore made. Owing to the fact that the boy had had convulsions and headache before any localized symptoms appeared, it seemed possible that the tumor might be anterior to the motor centres and might be invading them secondarily. The age of the boy, the absence of syphilis and of any signs of tuberculosis, together with the rather rapid growth, led me to think that the tumor was probably a glioma or gliosarcoma. The case was turned over to Dr. Conway, assistant surgeon to the Fourth Medical Division at Bellevue Hospital, who kindly consented to operate. The patient was also seen by Dr. Herman M. Biggs, who confirmed the local diagnosis and suggested the probability that it was a gliosarcomatous tumor. Dr. Conway operated on the patient June 4th. The details of the operation I do not purpose to give here, but leave them to be described by him.

THE OPERATION, BY DR. CONWAY.

On the day previous to the operation the scalp was thoroughly shaved and cleansed, the bowels were purged, and the patient was carefully nourished. At this time Dr. Dana mapped out the hand and arm centres, leaving an indelible mark with the silver-nitrate pencil.

Two hours before beginning proceedings five minims each of tincture of strophænthus and tincture of digitalis with a fortieth of a grain of strychnine sulphate were administered, because the pulse was somewhat feeble and the operation likely to be severe and prolonged.

June 4th.—The patient being etherized and the usual anti-septic precautions taken, a horseshoe-shaped incision was made, including an area about three inches in diameter, the base of

the semicircle being below upon the right side of the head, and the centre of the flap corresponding to the motor area previously marked out. The scalpel was carried firmly to the bone, incising the periosteum at the same time, the latter being turned down adherent to the scalp, thus exposing the bone at once. A conical trephine three quarters of an inch in diameter was applied to the skull over the arm centre, and after a great deal of difficulty, because of the extreme thickness of the bone, an opening was made. In removing the button of bone it was found that the dura was adherent, causing it to be slightly torn. The trephine was again applied above and a little posteriorly to the first opening and all the bone between and around was cut away with the rongeur forceps until the aperture in the skull measured nearly two inches in diameter. This was done because it was evident from the appearance of the dura that the tumor was extensive and would require a large opening. A T-shaped incision was then made in the dura over the centre of the tumor, which was found closely adherent to it, the pia and brain tissue being somewhat torn in separating the two from the dura. The tumor, which was found to be a flat, tough, and fibrous mass in appearance, about an eighth of an inch in thickness, was then separated from the pia and brain substance by means of the handle of a silver teaspoon. The new growth was so incorporated with the gray matter of the brain substance at about the centre of the first trephine opening that a small portion of brain substance was removed with it, and for a short space around this centre small deposits of the same substance, in a number of minute spots, were noticed, but not interfered with.

By exploration anteriorly, it was found that the growth extended probably some distance beyond the opening in the bone already made, but, as the portion already removed was two and a quarter by two inches and the patient was rapidly growing weak, it was thought advisable to allow any remnant to remain and be removed by a later operation.

All portions of the main growth posteriorly, above, and below having been thoroughly taken away, the edges of the incised dura were brought together with catgut and the scalp

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was stitched with interrupted silk sutures, drainage being provided for by means of very small rubber tubes.

It was immediately found necessary to stimulate him freely with the customary heart tonics, used hypodermically, until the heart became safely strong.

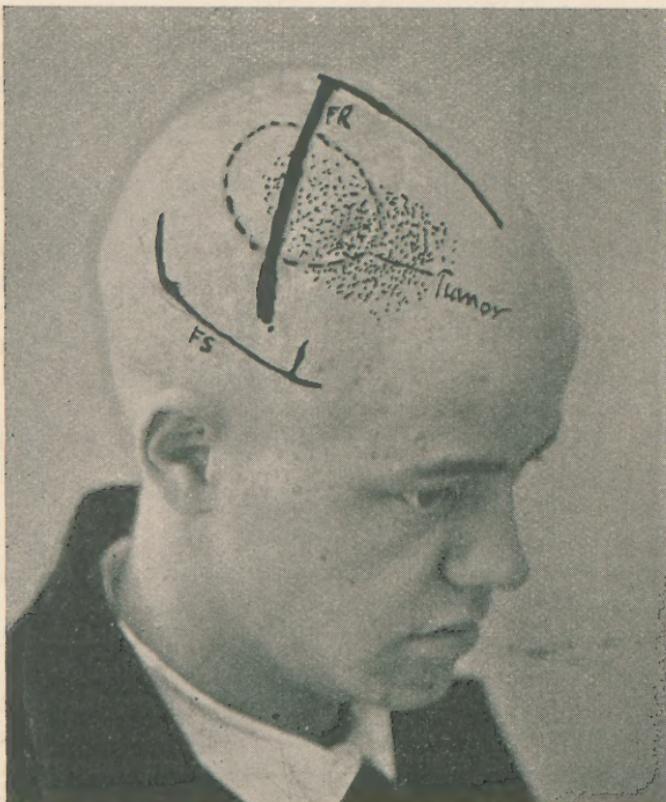
Three hours after the operation he had a general convolution, and during the same night three more followed, but none of them were of a very severe type.

The wound remained aseptic and rapidly healed, all sutures and drainage-tubes having been removed within five days. The temperature was elevated two degrees during the first week, but gradually became normal.

HISTORY CONTINUED, BY DR. DANA.

The arm and hand centres were mapped out upon the shaved scalp by myself, the skull was trephined, the dura opened, and a tumor found immediately under the point of the first trephine opening. The opening was enlarged extensively, and it was found that the growth lay directly beneath the dura mater, from which it had apparently started, and extended forward a considerable distance, being bounded anteriorly by about the middle of the frontal lobe, posteriorly it reached as far as the posterior edge of the first central convolution, and below it extended down to near the lower edge of the central convolutions. The tumor was in its posterior part, where it covered the central convolutions, easily stripped off from the pia mater; but beneath this area—that is to say, directly over the middle portion of the central convolutions—the cortex was seen to be congested, dark, and infiltrated with grayish spots. While not entirely destroyed, its functional activity was evidently impaired, for it did not respond to strong irritation of the faradaic current applied directly upon the convolution. On stripping the tumor up anteriorly it was found that about the base of the second frontal convolution the tumor had become attached to and infiltrated into the cortex so that this was torn in removing parts of it. As much as possible of the tumor was removed, but a considerable portion of the anterior part had to be left, although the opening in the skull was enlarged as much as was thought

safe. The patient made a good recovery, the wound healing by first intention; but in the first day he had two convulsions and during the following fortnight he suffered intensely from headaches, pain in the arm, and he was at times actively delirious.



The situation of the trephine opening and of the tumor (from a photograph taken a year after the operation). The dotted line indicates the outline of the trephined area; the dotted area indicates the position of the tumor.

The symptoms gradually abated, and by June 27th his mind was clear, his head was free from pain, and he felt thoroughly convalescent.

Physical examination at that time showed the following conditions: The paresis of the face was unchanged and the condi-

tion of the leg seemed the same. The left arm could be moved more freely; the patient raised it from his side, flexed and extended it with greater readiness; there was less rigidity, and the reflex excitability and tendency to twitching had entirely gone. There was still considerable weakness in extension and flexion, and pronation was very feeble. The fingers were held most of the time in extension, but they could be flexed feebly; they could also be slightly adducted and abducted, so that on the whole the movements of the arm were better than before the operation.

Sensation.—The pain in the arm had disappeared, and there was hardly any of the hyperalgesia which he had before experienced. Still hyperalgesia did exist, as shown by simultaneous pricks of the two sides or by pinches of the two forefingers, the boy always saying that he felt more pain when the skin of the left hand was pinched than when that of the right was so treated.

Light contact by touch of the finger or the head of a pin was appreciated normally, or almost so. There was a slight delay in contact sensation, however. Localization was slightly more defective than previous to the operation. A point on the thumb would be felt on the forefinger; two points, two centimetres apart, would be felt as one. Motor touch, so called, as shown by his attempts to describe an object placed in his hand, was defective, though not much so; he thought that a quarter of a dollar was a half dollar, and was rather doubtful of the nature of the coin altogether. Temperature sense was normal.

The muscular sense, as shown by appreciation of movements of the fingers and position of the fingers, hand, and forearm, was quite defective. The fingers when held out straight were said to be flexed, and attempts to place the right arm in the same position as that in which the left was placed were unsuccessful. Appreciation of weights was also defective, and attempts to use the hand in any way were extremely awkward, though this was largely due to the stiffness and weakness of the limb.

April 2, 1895 (eleven months after the operation).—The patient went until July, 1894, without further convulsions. Since

that time he has had about one convulsion a month. The seizures, however, are now unilateral only, and not accompanied with loss of consciousness, as was the case before the operation. They are preceded by an aura of tingling and slight pain beginning in the fingers and running up the arm. The hand and arm go through clonic movements, the face and leg twitch slightly, the eyes turn to the left, the leg is very slightly moved.

The paralysis is now less than before the operation. The boy can raise the arm straight above the head, flex and extend it, flex the fingers, especially in the ulnar distribution, and extend the fingers slightly, but not the wrist. He can pronate but not supinate. The fingers are kept in rather rigid flexion, and they are straightened with some difficulty. There is clonus on forced extension of the arm and hand. The left leg is a trifle weak, and drags a little on walking; the knee-jerk on the left side is exaggerated. The left side of the face shows slight paresis.

There is no pain or tenderness now in the affected side, nor is there any sensory disturbance in the face or leg.

The hand shows defective localizing sense. When a point on the finger is touched, he in the majority of cases refers it to the wrong finger, and he can not touch a given point on the affected hand with the fingers of the normal hand.

The sense of position of the fingers and hand, the tactile, pain, and temperature senses are normal or nearly so. He has no headaches; his eyesight is good, and there are only slight traces of the optic neuritis. His general health is good.

The piece of tumor removed was found to be from a spindle-celled sarcoma.

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EDITED BY

FRANK P. FOSTER, M.D.

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